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To turn the head frequently from one side to the other is a fault.

Two habits mark him who is void of sense: he frequently turns his head from side to side, and he answers precipitately.

If you fall into a passion standing, sit down: if you fall into a passion sitting, lie down.

Would you succeed in 'any affair, gallop over danger.

Sin is like fire: take away its fuel, it goes out of itself.

Boldly to face an assailant is the strongest shield.

When the mantle of misfortune unfolds itself, it is sometimes found to have enclosed an unexpected present.

I am surprised at the conduct of the man, who buys slaves to give them their liberty. Why does he not rather buy free men by his benefits? thus he would make them his slaves.

Prudent Foresight almost triumphs over Fate itself.

He who fears the day of reckoning, takes care what he buys.

He who gives himself up to idleness, instead of labouring in some profitable employment, depends no doubt for a livelihood on something else than honest industry.

To refuse alms with harshness, is to degrade yourself beneath the beggar.

No place is so capable of con-

taining your secret, as your own heart: if your own be not large enough to hold it, you cannot blame another's for letting it out.

A firm determination renders the heart joyful: the uncertainty of a wavering mind produces vexation.

I admire the man, who leads the life of the poor in this world, and on the day of retribution in the next finds himself among the rich.

Honours and high stations are not exempt from fear.

To give all we have is the last effort of liberality.

He who can be guilty of a crime is deficient in sense.

Kiss the hand of a treacherous enemy, if you cannot cut it off.

Under the guise of a friend, an enemy is sometimes found; and danger sometimes meets us on the safest road.

The worst a generous man can do is to withhold his benefits; and the best you can hope from a bad man is, that he shall do you no harm.

The man who is poor and wise despises the pomp of the rich fool.

The promises of a generous man are ready money and payment beforehand; those of a mean man are put offs and delays.

Man by his industry, as the lion by his strength, finds subsistence wherever he may be.

DISCOVERIES AND IMPROVEMENTS IN ARTS, MANUFACTURES, &c.

Patent of Mr. Richard Witty of Kingston, upon Hull, for rotative Steam Engines on a new principle, simpler, cheaper, and less liable to be out of repair than those now in use.

Dated Feb. 1810.

IN Mr. Witty's steam engine, cylinders with pistons moving in a rectilinear direction, are made to cause a rotative motion, of which they themselves partake, by obtruding weights outwards, from the centre of a wheel, (serving as a fly or momentum wheel), at its upper part, and again retracting them at its lower part, towards the cen-

tre, which causing always an excess of weight at one side of the wheel, must give it thereby a rotative motion.

Different methods are mentioned by the patentee of applying the above principle. The first consists in fixing to ur (or more) working cylinders with loaded pistons, in the direction of the radii of the wheel, with an equal number of short tubes communicating between their bottoms and a horizontal pipe, at right angles to them, which forms an hollow revolving axis, into which a fixed axis is fitted, in the manner of the core of a stop cock, so

as to be steam tight. In this fixed axis are formed two horizontal tubes, one at its upper and another at its lower part, the first of which communicates with the boiler, and the latter with the condenser: circular apertures, are made above and below, through the fixed axle from those tubes, within the part, where they are covered by the revolving hollow axle; by which as the machine revolves, the short tubes from the bottoms of the cylinders alternately communicate with the boiler, and the condensers through the passages mentioned: in the first case the loaded pistons are driven out from the center by the pressure of the steam; in the second they are retracted towards the center by the condensation. The loaded pistons are connected in pairs at the opposite sides of the machine, by two strong rods passing outside from cross pieces fixed to the tops of the loaded pistons. The loaded pistons fill the entire cavity of the cylinders, which are of course open at their outer end. The pistons are turned or drawn so as to be truly cylindrical, and the stuffing is fixed to the internal edges of the cylinders, by ring plates and screws, instead of being fastened to the pistons. A weighed circumference of metal, enclosing the cylinders and parts described at equal distances in every part from the fixed axle, forms a fly wheel to equalize the momentum of the revolution, and a frame to connect the parts firmly together.

In the second method, the cylinders move in and out from the center on tubes proceeding from the hollow axle, round which tubes stuffing boxes are placed at the inner ends of the cylinders, to make the joints steam tight; from the other ends of the cylinders rods proceed, that work through the circumference of the fly wheel, to which the apparatus is attached, and confine the cylinders to move in the radial lines. The cylinders in this method form the weights that turn the machine: the pistons are attached to the end of the tubes on which the cylinders move; and the communications between the boiler and condenser, and the cylinders, are made through these tubes, and through

the hollow rotative and fixed axes.

In the third method a cylinder passes entirely along the diameter of the wheel, and two weighed packed pistons connected by a rod move in it at opposite extremities; on the middle of the outside of the cylinder are cast axles, on which it turns: on the side of the cylinder pipes pass from its extremities to the center, where they communicate with perforated rotative and fixed axes, serving as circular valves, or stop-cocks, in the manner before described, to lead alternately to the boiler and condenser. The ends of the cylinder are closed by plates screwed to flanges, and the steam acts alone on the outer extremities of the pistons between them and those plates. Where two of these cylinders cross at right angles, the piston rod of one is split, or double, to let that of the other pass.

In the fourth method the cylinders at opposite sides of the wheel are managed so as to have the steam to act on both sides of the piston; and piston rods passing outward from them through stuffing boxes protrude weights attached to their ends, and again retract them alternately. The pipes are so placed that the steam enters the outer end of one cylinder, and the inner end of that opposite to it at the same time, and the piston rods are connected by cross pieces and external rods in the same manner as those of the first method, and the hollow rotative and fixed axes form communications between the boiler and condenser and the cylinders in the same mode successively.

For large engines of this description a different sort of perforated axes are used from those described;—in this latter kind, the axle has as many tubular perforations in it longitudinally as there are cylinders, each of which tubes communicates with its respective cylinder, by a pipe at right angles from one of its ends, while the other end opens into a circular aperture at the side of the axle, a fixed cylindrical ring embraces the axle where these apertures terminate, from which pipes pass in opposite directions to the boiler and the condenser. The perforated axle is ground into this hollow ring so as

to be steam tight, in the same manner that stop-cocks are made staunch.

The steam engines are made to turn either way, according to the side of the vertical line at which the aperture of the tubular valve, or cock, which communicates with the boiler, is placed; and Mr. Witty has contrived a method of changing the position of this aperture at pleasure, by a sliding, or shifting piece in the steam pipe; by which means the engine becomes fitted for drawing up coals from pits, and for similar operations, which require the wheel to move both ways.

The boilers, condensers, and air pumps, are the same for these engines as for those in common use; and pumps, or other alternating apparatus, are moved by cranks applied to the axle of the engine.

Observations... Mr. Witty's rotative engine has the advantage of all others of this nature, yet brought forward, in the facility of packing the pistons, and in the duration of the packing; the patentee observes on this head with much truth, "that he has found, and doubts not that others have also proved that pistons move with much greater facility, and much tighter, on a straight line in a cylinder, than in any other direction: consequently lighter packing makes them steam tight; the operation of re-packing and screwing it down is easier to perform, and they are less liable to get out of order than revolving pistons."

In these engines, beams are entirely superseded, and the substitute for valves is simpler than most others in use, except Mr. Dixon's sliding valve, being analogous to the cock with four ways, used in some of Mr. Trevithick's engines, and in some others.

Though a number of cylinders in this plan would be of use in equalizing the application of the weight in impelling the wheel, yet many are not absolutely necessary; where cheapness and simplicity are the chief objects, one cylinder alone, at one side of the wheel with a loaded piston, communicating by a rod with an equal weight at the opposite side, would turn the wheel round; and two cylinders at right angles to each

other, managed in this manner, would produce a very sufficient equality of impulse. Very little momentum would be lost in this engine, and but a small expense of framework would be required for fixing it in comparison to others.

The inconvenience which might arise from the centrifugal force of the weighted pistons, is obviated in a great measure by their being connected at opposite sides, so that they balance each other; and in most other respects this is the least objectionable, and most easily made of any of the rotative steam engines yet made public.

But with all these advantages it will take a considerable time, it is imagined, before they can be sold as cheap as beam engines of the same powers, on account of the greater expense of the cylinders, and of the bracing work necessary for fixing them firmly in the fly wheel. The tubular valve formed by the hollow axle, will be difficult to keep tight, as all stop-cocks are, which are much worked, and the fitting of both is on the same principle.

The longer the stroke of the pistons is for a given expense of steam, and the nearer the weights can be made to approach the center in their return, the greater will be the power of this engine; for thus the efficient weight will have the longer lever to act by in impelling the wheel, and that of the counteracting weight will be shorter; but in this case the centrifugal force of the counter weight will not balance that of the efficient weight in the whole of its motion, and this must be remedied either by checking the admission of the steam sooner beneath the ascending weight, or by regulating the machine so as to turn round more slowly.

With a single cylinder this rotative engine would have a power analogous to a fixed cylinder turning a wheel by a crank of equal length to the distance of the center of the efficient weight from the axle, with a force equal to the excess of the efficient weight above that of the counteracting weight, determined by the difference of the levers by which they act; two cylinders would give the force of two such cranks placed at right angles to each other, and a very

great number of cylinders would have the same effect nearly, as if about half the above mentioned excess of weight always acted at the extremity of the horizontal radius of the wheel; and according as the number of cylinders was great or small it would approximate one of those extremes. This is but a rough calculation of the powers of this engine, but it may suffice as well to give an idea of it to most of our readers, as one of more mathematical precision.

Very little more momentum would be lost in this engine, than what was consumed in the motion of the weighted pistons to and from the centre of the wheel, above the reduction of this, which could be effected by the well known mode of regulating the admission of the steam invented by Mr Watt.

The chief point of comparison in steam engines is, which will have most power for the least consumption of fuel; the next is, which will be cheapest in first cost and repairs, for equal powers. To the first point, Mr. Witty does not state that his engine has any superior pretensions, nor are any apparent: and those which he states it has to the second, can only be proved by comparing the prices of his engines with those on the common percussive principle, of equal efficacy.

The figures of Mr. Witty's engines may be seen in the Repository of Arts, xvii. 130 pl. 8.

Patent of Mr. William Docksey of Bristol, Milkright, for improvements in the process for manufacturing ivory black, and for pulverizing all articles, in which this operation is facilitated by torrefaction, or calcination, especially potter's clay, flints, colouring, and glazing materials.

Mr. Docksey's method of preparing ivory black, and the other articles mentioned in the title, consists in manufacturing them with a very small quantity of water, in grinding or reducing them to powder: by which much labour is saved and the stoves for evaporating the water, used in the processes now practised, are rendered unnecessary, and which pro-

cesses of drying injured the colour of ivory black. The patentee describes his method of making ivory black as follows.

"To manufacture ivory black, I take the bones and sloughs of the horns of animals, and calcine them to blackness, in close or air tight vessels. I then crush them in their dry state, between metal rollers of about two feet diameter, until they are broken sufficiently small to pass through a hopper into the eye of a millstone, and be reduced to powder between millstones, in an horizontal position, exactly similar to the method of reducing or grinding corn to flour. By a like process the powder thus obtained is then partly passed through a dressing machine constructed with brushes and fine iron and brass wire, upon a circular frame inclosed within a rim, which receives it. Such part as passes through the meshes of the wire (which should be about 68 to an inch) is sufficiently fine for use, and is damped down by a small quantity of water sprinkled upon it, and packed for sale;—the coarser part is returned to the hopper, and ground over again between the stones."

With respect to the flints, potter's clay, and colour and glazing materials, Mr. Docksey states his method is to take the calcined flint, dry clay, calcined lead, lead ore, manganese, or other article of this nature, and pass it under stampers, or heavy hammers to break it sufficiently small to pass between metal rollers; where it is crushed so fine as to be reduced to a pulverulent state: it is then ground in its dry state, between mill stones, in a manner, similar to that before described for manufacturing ivory black. It is then passed through a dressing machine (inclosed within a very tight and close bina which receives it) the coarser parts being thus separated, the finer parts are then mixed with water in a tub or deep vessel. The coarser parts are farther separated by subsidence, and the finer parts passed through a fine lawn or cypress sieve: the water is then drained off, and evaporated by heat from the substance.